

E.) REMARKS

This Response is filed in response to the Office Action dated July 3, 2006.

Entry of this amendment is requested to clarify the claims for purposes of appeal. Upon entry of this response, claims 1-2, and 4-17 will be pending in the Application.

Independent claims 1, 8 and 14 are amended to clarify that the tow or resulting tow (claim 14) have a controlled, predetermined electrical resistance that remains substantially unchanged in response to changes in environmental conditions, which is neither taught or suggested by the prior art.

In the outstanding Office Action, the Examiner rejected claims 1-2 and 4-7 under 35 U.S.C. 102(b) as being anticipated by McCullough, Jr. et al. (U.S. Patent No. 5,356,707) hereafter "McCullough"; rejected claims 14-17 under 35 U.S.C. 102(b) as being unpatentable over McCullough; and rejected claims 8-13 under 35 U.S.C. 103(a) as being anticipated by Schimpf et al. (U.S. Patent No. 5,098,688) hereafter "Schimpf".

Rejection under 35 U.S.C. 102

A. Claims 1-7

The Examiner rejected claims 1-2 and 4-7 under 35 U.S.C. 102(b) as being anticipated by McCullough.

Specifically, the Examiner stated that

The cited reference teaches the claimed invention including electrically resistant tow having stretched carbon fibers- col 8, lines 54-68; col 10, lines 11-15. concerning claims 5 and 6, the reference teaches stabilizing step and apparent turbid orientation for its fibers within the tow- col 11, lines 36-40; col 11, lines 36-60. concerning claims 2, 4, it is believed there would be carbon molecules being aligned via the aspect of the fibers being crimped- col 10, lines 65- col 11, line 22, col 13, lines 13-20. concerning claim 7, the reference teaches an increased electrical resistance in col 10, lines 6-8.

Applicants respectfully traverse the rejection of claims 1-2 and 4-7 under 35 U.S.C. 102(b).

McCullough, as understood, is directed to the manufacture of nonlinear fire resistant carbonaceous polymeric fiber or tow or fibers having a reversible deflection of 1.2:1. Processing including crimping the fibers with at least 6 to 15 crimps per inch and then heating the fibers in a relaxed and unstressed condition (col. 8, lines 67-68) to produce a heat induced thermoset reaction.

In contrast, independent claim 1, as amended, recites a tow comprising: a predetermined number of carbon fibers forming a tow; wherein the tow has an alignment angle from 0 to 30 degrees after being subjected to a predetermined stress level while simultaneously being subjected to a first predetermined elevated temperature associated with fabricating the tow, the tow having a controlled, predetermined electrical resistance remaining substantially unchanged in response to changes in environmental conditions. (emphasis added)

The examiner is reminded that “[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).” See Manual of Patent Examining Procedure, 8th Edition (MPEP), Section 2131.

In addition, “[t]he identical invention must be shown in as complete detail as is contained in the ... claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).” See MPEP, Section 2131.

Several of the features recited by Applicant in independent claim 1 are not taught or suggested by McCullough. First, McCullough does not teach or suggest the tow having a controlled, predetermined electrical resistance as recited by Applicant in independent claim 1. McCullough teaches producing four groups of crimped carbonaceous fibers. See col. 9, lines 50 through col. 10, line 34. Each of the four groups of fibers of McCullough differs from each other and possess differing amounts of electrical resistance (see first group col. 9, lines 53-66; second group col. 9, line 67 through col. 10, line 10; third group col. 10, lines 11-15; fourth group col. 10, lines 15-19), not the use of a single fiber construction and then increasing the electrical resistance of the single fiber construction by use of the process of the present invention. Each group of fibers in McCullough is identified in relation to a range of nitrogen content in the fibers.

Further, each group of fibers in McCullough identifies broad ranges of resistance levels (each in units ohms/cm): greater than 4×10^6 , from about 4×10^6 to about 4×10^3 or less than 10^{-1} . In other words, in addition to identifying different group of fibers that are different from each other, there is no teaching or suggestion that the electrical resistance of the individual fibers of any of the groups can be closely controlled. Moreover, even if it could somehow be argued that the broad ranges of these groups of fibers are representative of controlled, predetermined electrical resistance levels, which they are not, there is no teaching or suggestion that these electrical resistance ranges are substantially unchanged in response to changes in environmental conditions. The present application, as amended, claims tows of which "the electrical resistance values remain substantially constant over a broad range of operating conditions." See claims 1, 8 and 14. The term operating conditions is further clarified in paragraph [0016] in that "the level of electrical resistance in the carbon fiber tows is substantially constant over a broad range of temperatures and other environmental conditions." Thus, since McCullough does not teach or suggest all of the limitations recited in independent claim 1, Applicant respectfully submits that McCullough does not anticipate Applicant's invention as recited in independent claim 1.

Therefore, for the reasons given above, independent claim 1 is believed to be distinguishable from McCullough and therefore is not anticipated nor rendered obvious by McCullough.

Dependent claims 2 and 4-7 are believed to be allowable as depending from what is believed to be allowable independent claim 1 for the reasons given above. In addition, claims 2 and 4-7 recite further limitations that distinguish over the applied art.

For example, as to claims 2 and 4, McCullough makes no mention of the term "alignment angle" and only mentions the term "angle" in the context of inert blown air over the fiber tow (see col. 7, lines 43-51). Applicant continues to respectfully disagree that the passage cited in McCullough (see col. 10, line 65 through col. 11, line 22) by the Examiner teaches aligning the fibers, much less teaching decreasing alignment angles or teaching specified alignment angles.

As to claim 5, Applicant respectfully disagrees that the passage cited in McCullough (see col. 11, line 36-40 and col. 11, lines 36-60 through col. 11, line 22) by the Examiner teaches stabilization as recited in the claimed invention. McCullough does refer to oxidation stabilized

polyacrylonitrile yarn. However, the oxidation stabilization in McCullough occurs "while the fiber is in a relaxed or unstressed state and under an inert, nonoxidizing atmosphere." *See* col. 9, lines 9-10. Since the claim 1, from which claim 5 depends, recites the tow "being subjected to a predetermined stress level while simultaneously being subjected to a first predetermined elevated temperature associated with fabricating the tow," the term oxidized stabilization as disclosed in McCullough cannot be considered the same as the claimed invention.

As to claim 6, as previously discussed for claim 5, Applicant respectfully disagrees that the passage cited in McCullough (*see* col. 11, line 36-40 and col. 11, lines 36-60 through col. 11, line 22) by the Examiner teaches a turbostratic orientation, not to mention the fact that the crimped fibers are nonstressed during the process.

As to claim 7, the Examiner has cited a passage in McCullough that indicates a range of tow resistance for a fiber construction, with the Examiner then concluding that McCullough teaches increased electrical resistance. Applicant respectfully disagrees. McCullough teaches use of four different kinds of fibers classified into four groups, from which the Examiner has merely selected a portion discussing but one of these groups. Each of the four groups of fibers differs from each other and already possesses differing amounts of electrical resistance, not the use of a single fiber construction and then increasing the electrical resistance of the single fiber construction by use of the claimed process of the present invention.

In conclusion, it is respectfully submitted that claims 1-2 and 4-7 are not anticipated nor rendered obvious by McCullough and are therefore allowable.

B. Claims 8-13

The Examiner rejected claims 8-13 under 35 U.S.C. 102(b) as being anticipated by Schimpf.

Specifically, the Examiner stated that

The cited reference teaches the claimed invention including a process for a tow comprising stressing the tow, heating same at least twice- col 2, lines 54-68. concerning claims 9 and 11, the reference teaches stabilizing steps and adding heating steps in col 2, line 54-68. concerning claim 12, the reference teaches PAN fibers in col 2, lines 11-15. concerning claim 13, the reference teaches graphitization in col 2, 2, lines 40-48. concerning claim 10, the reference teaches carbonization in col 2, lines 13-15 as required by claim 10.

Applicants respectfully traverse the rejection of claims 8-13 under 35 U.S.C. 102(b).

Schimpf, as understood, is directed to a process for producing high strength carbon fibers, in which the fibers are subjected to stretching during both stabilization and carbonization temperatures.

In contrast, claim 8, as amended, recites a method for fabricating a tow, the steps comprising: providing a predetermined number of carbon precursor fibers to form a tow; stressing the tow to a predetermined stress level while simultaneously subjecting the tow to a first predetermined elevated temperature associated with fabricating the tow; and subjecting the tow to a second predetermined elevated temperature associated with fabricating the tow, the resulting tow having a controlled, predetermined electrical resistance remaining substantially unchanged in response to changes in environmental conditions. (emphasis added)

Several of the features recited by Applicant in independent claim 8 are not taught or suggested by Schimpf. First, Schimpf fails to teach or suggest producing a tow having a controlled, electrical resistance as recited by Applicant in independent claim 8. Schimpf is directed to the manufacture of carbon fibers having high levels of strength and stiffness, and Schimpf makes no mention of the term "electrical resistance" in the context of a resultant tow. Second, Schimpf fails to teach or suggest producing a tow having a controlled, electrical resistance remaining substantially unchanged in response to changes in environmental conditions. Thus, since Schimpf does not teach or suggest all of the limitations recited in independent claim 8, Applicant respectfully submits that Schimpf does not anticipate Applicant's invention as recited in independent claim 8.

Therefore, for the reasons given above, independent claim 8 is believed to be distinguishable from Schimpf and therefore is not anticipated nor rendered obvious by Schimpf.

Dependent claims 9-13 are believed to be allowable as depending from what is believed to be allowable independent claim 8 for the reasons given above. In addition, claims 9-13 recite further limitations that distinguish over the applied art.

In conclusion, it is respectfully submitted that claims 8-13 are not anticipated nor rendered obvious by Schimpf and are therefore allowable.

Rejection under 35 U.S.C. 103

The Examiner rejected claims 14-17 under 35 U.S.C. § 103(a) as being unpatentable over McCullough.

Specifically, the Examiner stated that

The reference teaches the basic claimed invention including a method for making a tow of several carbon fiber members, comprising stressing carbon PAN fibers, subjecting same to elevated temperature, adding additional types fibers thereto and blending the fibers to form a tow- col 9, line 44- col 10, line 15; col 11, lines 13-22; col 8, lines 54-68, concerning claim 16, the reference teaches stretch breaking process in col 10, line 35-37, concerning claims 15 and 17, it is submitted the types of fiber filaments used during the process is of no patentable consequences which must be manipulatively distinct.

Applicants respectfully traverse the rejection of claims 14-17 under 35 U.S.C. § 103(a).

The above discussion of McCullough is equally applicable here, and is hereby incorporated herein.

In contrast, independent claim 14, as amended, recites a method for fabricating a tow having a controlled, predetermined electrical resistance, the steps comprising: providing a predetermined number of carbon polyacrylonitrile fibers defining a predetermined number of filaments forming a portion of a tow; stressing the predetermined number of carbon polyacrylonitrile fibers to a predetermined stress level while simultaneously subjecting the predetermined number of carbon fibers to a first predetermined elevated temperature associated with fabricating the predetermined number of carbon polyacrylonitrile fibers; subjecting the predetermined number of carbon polyacrylonitrile fibers to a second predetermined elevated temperature associated with fabricating the carbon polyacrylonitrile fibers, the second predetermined elevated temperature converting the predetermined number of carbon polyacrylonitrile fibers to carbon fibers defining a predetermined number of carbon fiber

filaments; providing a predetermined number of nonconductive fibers defining a predetermined number of filaments forming a portion of a tow; and blending the predetermined number of carbon fiber filaments with the predetermined number of nonconductive fiber filaments to form a tow, the resulting tow having a controlled, predetermined electrical resistance remaining substantially unchanged in response to changes in environmental conditions. (emphasis added)

Several of the features recited by Applicant in independent claim 14 are not taught or suggested by McCullough. For reasons previously discussed for claim 1, McCullough does not teach or suggest a resulting tow having a controlled, predetermined electrical resistance remaining substantially unchanged in response to changes in environmental conditions as recited by Applicant in independent claim 14. Therefore, Applicant respectfully submits that McCullough does not anticipate nor render obvious Applicant's invention as recited in independent claim 14.

In addition, the crimping of the fibers, as claimed, in McCullough is not performed in the present invention. Further, the fibers of the claimed invention are not stressed during the heating process as taught by McCullough, which stressing is specifically taught to be avoided to achieve the desirable properties of McCullough.

Applicant submits that dependent claims 15-17 are distinguishable from McCullough for at least the following reasons. To begin, dependent claims 15-17 are believed to be distinguishable from McCullough as depending from what is believed to be allowable independent claim 14 as discussed above. Further, Applicant respectfully disagrees with the Examiner's characterization of claims 15 and 17, as being types of fiber filaments. In actuality, claims 15 and 17 recite ratios of mixing types of fiber filaments, which ratios are not taught or suggested by McCullough.

Therefore, in view of the above, dependent claims 15-17 are believed to be distinguishable from McCullough and therefore are not anticipated nor rendered obvious by McCullough. In addition, claims 15-17 recite further limitations that distinguish over the applied art. In conclusion, it is respectfully submitted that claims 14-17 are not anticipated nor rendered obvious by McCullough and are therefore allowable.

CONCLUSION

In view of the above, Applicant respectfully requests reconsideration of the Application and withdrawal of the outstanding objections and rejections. As a result of the amendments and remarks presented herein, Applicant respectfully submits that claims 1-2 and 4-17 are not anticipated by nor rendered obvious by McCullough, Schimpf or their combination and thus, are in condition for allowance. As the claims are not anticipated by nor rendered obvious in view of the applied art, Applicant requests allowance of claims 1-2 and 4-17 in a timely manner. If the Examiner believes that prosecution of this Application could be expedited by a telephone conference, the Examiner is encouraged to contact the Applicant.

The Commissioner is hereby authorized to charge any additional fees and credit any overpayments to Deposit Account No. 50-1059.

Respectfully submitted,
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